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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,955	11/18/2003	Jeff Mackey	2269-6102US (03-0857.00/U	4444

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EXAMINER	
ROSASCO, STEPHEN D	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 11/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/715,955	MACKEY, JEFF	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) *47-58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46 and 59-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/18/03, 8/31/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Applicant's election without traverse of Group I (claims 1-46 and 59-64) in the reply filed on 10/19/05 is acknowledged.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-21 and 59-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Unno (5,459,000).

Unno teaches a photomask that projects radiation beams from light-projecting portions when said photomask is irradiated, said photomask comprising: a reticle having a fine pattern of light-projecting portions separated by light-non-projecting portions formed thereon, the light-projecting portions and the light-non-projecting portions comprising light-reflecting portions and light-blocking portions, respectively; and

coherency reducing means for reducing coherence between radiation beams that are projected from respective adjacent light-projecting portions, said coherency reducing means comprising polarizing means provided for at least one group of the light-projecting portions for orienting polarization of radiation beams from the one group in a direction orthogonal to a direction of polarization orientation of radiation beams from another group of light-projecting portions.

And wherein said polarizing means comprises first polarizing means provided for the one group of light-projecting portions and second polarizing means provided for the other group of light-projecting portions, the first and second polarizing means respectively

orienting polarizations of light beams from the respective groups of light-projecting portions in orthogonal directions.

And an image forming method for illuminating first and second grating patterns to form an image of the second grating pattern using a first light beam and to form an image of the first grating pattern using a second light beam, said method comprising the steps of:

providing a first grating pattern having grating lines and a second grating pattern having grating lines substantially orthogonal to the grating lines of the first grating pattern;

linearly polarizing a first light beam in a first plane and;

illuminating the first and second grating patterns with the first light beam so that the first light beam is obliquely incident to form a plane of incidence parallel to the grating lines of the first grating pattern;

linearly polarizing a second light beam in a second plane orthogonal to the first plane;

illuminating the first and second grating patterns with the second light beam so that the second light beam is obliquely incident to form a plane of incidence parallel to the grating lines of the second grating pattern;

providing the first grating pattern with polarizing means for blocking the first light beam, to form an image of the first grating pattern using the second light beam; and

providing the second grating pattern with polarizing means for blocking the second light beam, to form an image of the second grating pattern using the first light beam.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-46 and 59-64are rejected under 35 U.S.C. 103(a) as being unpatentable over Unno (5,459,000) in view of Kim et al. (6,057,970).

In the claimed invention: claims 1-21 are directed to a polarized reticle comprising: a reticle including at least one first patterned region at least partially surrounded by at least one second patterned region, the first patterned region and the second patterned region each having different patterns defined thereon; a polarized material having a first polarization direction disposed over at least a portion of the first patterned region of the reticle; and a polarized material having a second polarization direction generally orthogonal to the first polarization direction disposed over at least a portion of the second patterned region of the reticle.

Claims 59-64 are directed to a method of making the polarized reticle.

Claims 22-58 are directed to a system for using the polarized reticle for exposure.

Claim 22 is to a photolithography system comprising: an illumination controller operably coupled to an illumination source configured to irradiate linear polarized light; and a movable half-wave polarizer disposed between a polarized reticle and the illumination source, the polarized reticle comprising: a reticle including at least one first patterned region at least partially surrounded by at least one second patterned region, the first patterned region and the second patterned region each having different patterns defined thereon; a polarized material having a first polarization direction disposed over at

least a portion of the first patterned region of the reticle; and a polarized material having a second polarization direction generally orthogonal to the first polarization direction disposed over at least a portion of the second patterned region of the reticle.

And (claims 26 and 31-43) are directed to the polarized material disposed over the at least a portion of the second patterned region:

wherein the polarized material is an organic polymer selected from the group consisting of a ferroelectric polymer, polyvinylidine fluoride, and a liquid crystal polymer;

wherein the polarized material is an inorganic material selected from the group consisting of calcite, mica, quartz, and silica.

The applicant discusses the limitations of the prior art in that in conventional photolithography, the reticle having the peripheral pattern and the array pattern are exposed to the illumination source at the same time. However, the optimal illumination conditions for the array region and the peripheral region are not identical. The term "illumination condition" as used herein should be understood to include the distribution of angles of light used to irradiate the reticle and the total intensities of the light in those angles. A relatively tightly spaced pattern characteristic of the array region typically requires illumination by a circular annulus of light at a fairly steep incident angle. A relatively sparse pattern characteristic of the peripheral region typically has its optimal illumination conditions when using a single plane wave of incident light. Thus, each region of the reticle has particular illumination conditions such as depth of focus, dose and angle of incident light, among others, which have different optimal values for the array and the peripheral region. Therefore, if the illumination conditions are optimized for the array region, the illumination conditions for the peripheral region are sub-optimal and vice versa.

Unno teaches a photomask that projects radiation beams from light-projecting portions when said photomask is irradiated, said photomask comprising: a reticle having a fine pattern of light-projecting portions separated by light-non-projecting portions formed thereon, the light-projecting portions and the light-non-projecting portions comprising light-reflecting portions and light-blocking portions, respectively; and

coherency reducing means for reducing coherence between radiation beams that are projected from respective adjacent light-projecting portions, said coherency reducing means comprising polarizing means provided for at least one group of the light-projecting portions for orienting polarization of radiation beams from the one group in a direction orthogonal to a direction of polarization orientation of radiation beams from another group of light-projecting portions.

And wherein said polarizing means comprises first polarizing means provided for the one group of light-projecting portions and second polarizing means provided for the other group of light-projecting portions, the first and second polarizing means respectively orienting polarizations of light beams from the respective groups of light-projecting portions in orthogonal directions.

And an image forming method for illuminating first and second grating patterns to form an image of the second grating pattern using a first light beam and to form an image of the first grating pattern using a second light beam, said method comprising the steps of: providing a first grating pattern having grating lines and a second grating pattern having grating lines substantially orthogonal to the grating lines of the first grating pattern;

linearly polarizing a first light beam in a first plane and;

illuminating the first and second grating patterns with the first light beam so that the first light beam is obliquely incident to form a plane of incidence parallel to the grating lines of the first grating pattern;

linearly polarizing a second light beam in a second plane orthogonal to the first plane;

illuminating the first and second grating patterns with the second light beam so that the second light beam is obliquely incident to form a plane of incidence parallel to the grating lines of the second grating pattern;

providing the first grating pattern with polarizing means for blocking the first light beam, to form an image of the first grating pattern using the second light beam; and

providing the second grating pattern with polarizing means for blocking the second light beam, to form an image of the second grating pattern using the first light beam.

The teachings of Unno differ from those of the applicant in that the applicant teaches that the use of different materials for the polarized material, such as, an inorganic material selected from the group consisting of calcite, mica, quartz, and silica.

Kim et al. teach a lithography apparatus comprising: a light source; and an optical lens system which includes: at least one isotropic optical unit for focusing a light from the light source on a focusing point; and

a birefringent optical unit for forming dual focus on different focusing points along an axis of the optical lens system in response to polarization of the light, thereby a depth of focus being substantially increased.

And wherein the birefringent optical unit is made of crystal, calcite, mica, birefringent polymer, a parallel plate, a lens, a prism or an optical wedge.

It would have been obvious to one having ordinary skill in the art to take the teachings of Unno and combine them with the teachings of Kim et al. in order to make the claimed invention because Kim et al. amply teach the benefits of using their birefringent material and it would be obvious to one in the art to choose a material with known and beneficial properties.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Rosasco
Primary Examiner
Art Unit 1756

S.Rosasco
10/31/05